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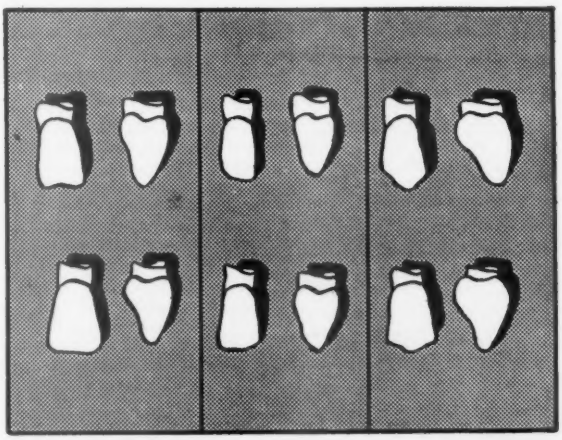

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BRITISH DENTAL JOURNAL

The Journal of the British Dental Association

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ORIGINAL COMMUNICATIONS

DENTAL PHOTOGRAPHY WITH A SPECIALLY DESIGNED UNIT[1]

BY JAMES M. DYCE, L.R.C.P.EDIN., L.D.S.GLAS., and
MARION E. SMALL, *Photographer, The Dental Photographic Department, Guy's Hospital, University of London*

THE Dyce Deep Focus Camera has been designed as an all-purposes dental camera, i.e. to contain the following features:

Automatic Operation.—The camera can be operated without a fore-knowledge of photography.

Compactness.—The lighting and camera are combined in a simple unit of small bulk.

Movements.—All patient movements and camera movements are effectively dealt with.

Versatility.—It can photograph a complete range of dental subjects, from the $\frac{1}{2}'' \times \frac{3}{4}''$ area needed for study of the occlusal markings on one molar, or the margins of a gold inlay, up to the $16'' \times 24''$ area used by orthodontist and prosthetist. The camera will also photograph at infinity. This article treats exclusively with the mouth but for larger areas relative standards apply.

Clinical Perspective.—It takes photographs from the angle of observation normally used by the clinician without interrupting his work or disturbing the equipment he is using.

Composition.—The subject can be readily viewed at all times through the camera lens reflex system. This ensures that the point of interest is in the centre of the picture.

Depth of Field.—Sufficient depth makes it practical to photograph any groups of teeth from any angle and have all in focus. This includes the oral pharynx.

Valid Reproduction of Subject in Colour and/or Black and White.—It gives constant colour reproduction and complete control of highlights on highly reflecting surfaces.

Measurement of the Photograph.—2 times; 1 : 1 ; 1 : 2 image to subject ratio. Exact size reproduction.

Variety of Films.—It will use any 35 mm. film of length up to 36 exposures. The three recommended are Kodachrome K135, Kodak Panatomic X, Ilford Panchromatic F.

Research Facilities.—It is supplied with the necessary standard colour charts and filters, making it possible to do research in colour values of dental subjects. Polar screens may also be used.

Ease of Reprojection.—The usual 2″ square slide is used to mount the transparencies for projection.

Speedy Use.—For recording clinical work photographs can be produced quickly without interrupting the chairside dentistry in progress. The stand for the camera has been designed so that it can be located with great ease in front of a patient at any time.

Foolproof Operation.—The camera is electrically operated. The three circuits are coupled in such a way as to make it almost impossible to go wrong.

The Dyce Deep Focus Camera achieves most of these necessities. As can be seen in Figs. 1 and 2, there are three main features in the general design. The camera holds within its construction the lighting system in one compact unit. The stand is similar to the dental mobile X-ray unit. This gives universal movement. The base carries in a box the power unit, which supplies three electric circuits to self-operate the camera.

[1] A synopsis of papers read by the principal author before the East of Scotland Branch and the East Midland Branch of the British Dental Association.

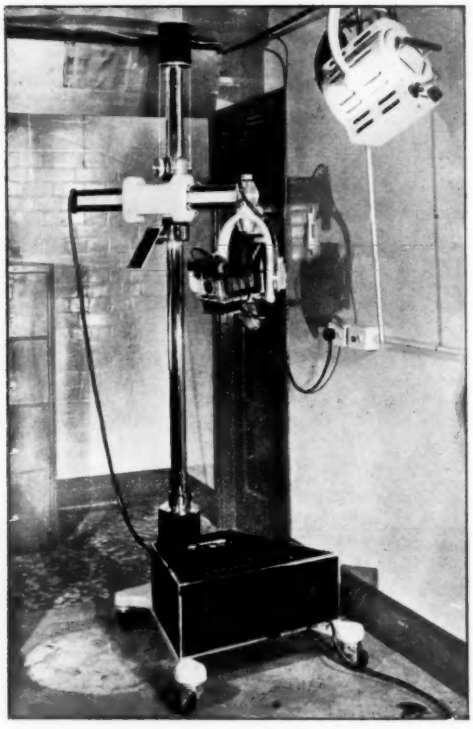

FIG. 1.

FIG. 2.

Automatic Operation.—The factors concerned in photographing the mouth have been reduced to the smallest number of variables. The following areas have been selected as the minimum required : $\frac{1}{2}'' \times \frac{3}{4}''$; $1'' \times 1\frac{1}{2}''$; $2'' \times 3''$. The camera is readily adjusted for them. The setting of the iris for each is named, relative to a choice of three films. By means of coupled electric circuits no light flash can be made or piece of film exposed unless a fresh piece of film has been wound into place and unless the iris lever is in the clip at the place named as above. Operation of the camera is as follows :

1. A suitable length of film is inserted.
2. The automatic counter for " pictures taken " set at " O."
3. The size of subject to be photographed is decided.
4. The iris lever clip is set at the position or number indicated on the exposure table supplied.
5. The lens housing is racked to the corresponding position on the camera as marked in the table.
6. The viewing light is switched on to supply illumination for composing the picture.
7. The power unit is switched on; this supplies the voltage for the flash tubes.
8. The subject is viewed through the camera lens reflex system and positioned.
9. The film is wound on to the first exposure.
10. The iris lever (which may have been removed from the setting mentioned above to allow full viewing through the lens) is re-set in its clip.
11. The flash meter needle is observed to be in the red area of the meter.
12. The take button is pressed.

Compactness.—The camera and lighting being one unit it can be swung into position in front of the patient's head without interfering with the lay-out of the oral operation in progress.

Movement.—The patient is settled in the chair with the back of the neck and head properly supported by the head-rest. Mouth props and lip retracters help to expose the area and keep it steady. The speed at which the picture is taken, which is in the region of 1/6,000th second, controls all movement effectively.

Versatility.—The optical arrangement allows of a complete range of suitable subject areas to be photographed.

Clinical Perspective and Composition.—By viewing through the lens of the camera throughout the entire procedure, except at the moment of the flash, it is possible to make each picture tell the full story expected of it on the lecture screen.

Depth of the Field.—The intensity of illumination has been increased to such an extent that whereas in the past colour photographs with Kodachrome were often taken at an aperture

of f12·5 and $\frac{1}{2}$ sec. exposure time, the aperture now used is f64. The depth of field has been massively increased so that the operator does not require to be practised in the art of making use of the depth available. The subject can also be photographed from the angle of view most suited to the teaching picture, irrespective of the front to back depth of the view.

Valid Reproduction.

(a) *Colour.*—Everyone who has studied the problems of colour—physical and psychological, knows that criticism born of ignorance is still evident. People say first that colour depends so much on our "point of view." Secondly they ask whether the colour film sees colour that the eye does not see. Thirdly, the observer can interpret the colour he is looking at because we have means of scientifically recording colour. The time will come when it will be possible to apply widely what can now only be applied to small sections of the problem. Fourthly, all the factors in the chemistry and physics of film manufacture and processing cannot be controlled. At least one factor among the many variables has been more accurately fixed by this camera set-up. The light source is a constant. Whereas in the past there was a big variable in the photoflood lamps' output, electronic experts maintain that the light output of the electronic flash tube is constant. This shows immediately in the resulting transparencies. No assertion is made that fully valid reproduction of colour is automatic. As a means of aiding other colour-determining factors, the camera is supplied with materials for a scientific approach to the problem, viz. a Standard Gray Wedge and Colour Chart.

(b) *The Disturbing Nature of Highlights.*—It has long been a desirable feature in photography of the mouth to "kill the highlights" which disturb a really critical examination of highly reflecting surfaces such as enamel. It is possible by polarising the light to remove the conflicting rays of light and allow only parallel rays to enter the lens. Colour photographs of desert spaces are greatly improved, the heat haze or dazzle being completely removed, by polarising the light which enters the lens. The angle of this light is usually less than 30 degrees to the horizontal. In oral photography the problem is more difficult for the light used goes directly forward to the surface of the subject to be photographed and back again into the lens in almost parallel beams right beside one another. It is necessary to polarise both the light source and the lens to deal effectively with the highlight reflection. This automatically means that there is anything up to a six or eight times loss of light by double polar screening. The great intensity of illumination available compensates for this. It is possible to do what has hitherto been impossible, viz. to reduce all highlights to a "matt surface." The full effect of this on valid reproduction has not been studied.

Measurement of the Photograph.—The film used is 35 mm. miniature camera film. The film frame area is $1'' \times 1\frac{1}{2}''$. When photographing a subject area of $\frac{1}{2}'' \times \frac{3}{4}''$ the image will appear on the transparency two times enlarged. This is an accurate two times enlargement. When photographing a subject area of $1'' \times 1\frac{1}{2}''$ the subject and the image are the same size. There is a relationship of one to one. When the subject area is $2'' \times 3''$ the image on the film is still $1'' \times 1\frac{1}{2}''$ as the subject is reduced to half its normal size. The ratio is one to two. Provided the subject has been accurately placed in the picture the image in the transparency can be measured accurately.

Variety of Films.—Three films are recommended for dental use with the camera: Daylight Kodachrome, Ilford Panchromatic "F," Kodak Pan "X." The advantage of being able to use daylight type Kodachrome is almost as important as the fact that we have a constant light output source of illumination. Many colour pictures in the past have been spoiled because daylight was allowed to light the subject while the camera contained the type of film designed for use by photoflood lamp illumination. This camera can be used in any surgery without light restrictions.

The two common low speed fine grain black and white films are useful for many dental subjects where big enlargements are desired.

Any length of 35 mm. film can be used up to approximately 36 exposures.

Points of the General Design

Clinical Perspective and Composition.—To produce the exact picture area required it is best to view through the lens of the camera. This is accomplished by inserting a mirror in the line axis of the lens in a metal housing between the lens and the camera body. The light which enters the lens strikes the mirror and passes upwards at right angles. By means of further optical devices it is possible to view an enlarged image of the subject at all times from the back of the camera. During the period of the flash the mirror in the lens line axis moves out of its central axial position to the light rays. Immediately the 1/6,000th sec. flash has taken place it is returned to its position.

These are illustrated in the following three diagrams :

Fig. 3 contains the lens, extension bellows, mirror housing.

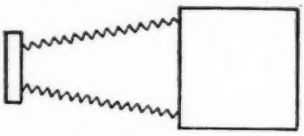

FIG. 3.

Fig. 4 illustrates the path of a ray of light through the lens, off at right angles to the mirror in the housing, thence to the eye at a convenient position behind the camera.

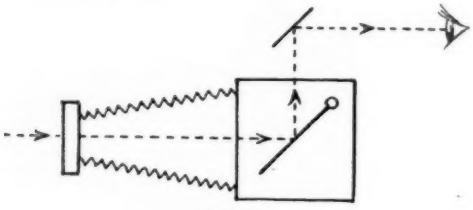

FIG. 4.

Fig. 5 illustrates the position of the first mirror at the moment of " take." The camera has been added to the diagram. The electrical circuit is so arranged that the flash cannot take place unless this mirror is in this position. Synchronisation is absolute.

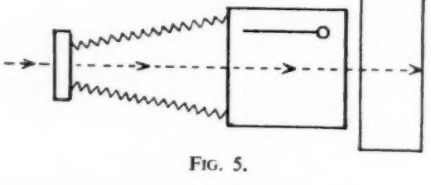

FIG. 5.

Areas of Dental Interest are Prearranged.

It is important to be able quickly to select the exact size of subject area to be photographed and to set the camera position. Fig. 6 is the view looking down on the top of the camera drawn as a diagram. It will be seen that the following data are readily available. When the lens is moved to any position it is possible to tell immediately the area of the subject being covered when the lens is focused, the relationship of the size of the subject to the size of the image on the screen (reduction scale), and thirdly, the distance which a marked position

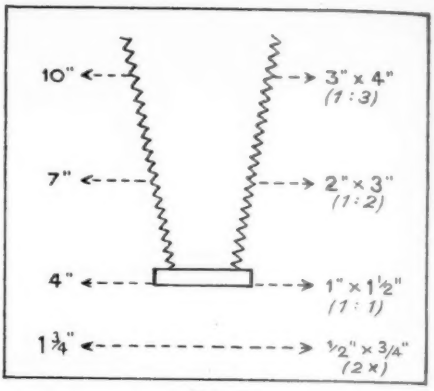

FIG. 6.

on the camera should be placed from the subject. This latter is a quick method of focusing. Fine focusing is achieved by moving the camera back and forth with the locking nuts of the main stand in their unlocked position, while viewing is done through the view finder.

THE ELECTRONIC FLASH TUBE

This tube produces a flash of light of great intensity and of minutely short duration. The flash is like that produced by the chemical flash bulb used in press photography (excepting for duration, colour values, etc.). This tube can however be re-used thousands of times. The flash is produced by making a 2,500 volt spark inside a glass tube. The duration of the flash is approx. 1/6,000 sec.

In 1931 Professor Harold E. Egerton in America took up once more the old idea of employing an electric spark as a source of illumination. In the following years the development was rapid. At an early stage during the last war the Air Force decided to adapt the electronic flash lamp as a source of illumination for night photography over enemy territory. Taking photographs from altitudes of a mile or more was made possible by the enormous flash energies developed with each flash. The extremely short duration of each flash made it impossible for the enemy to locate the aircraft carrying the photographic outfit. An adverse condition was the extremely heavy weight of the necessary equipment such as condensers, etc. Only big aircraft could be employed on photographic operations. In many cases the aircraft had to be stripped of every piece of equipment which was not absolutely necessary for the job, very often including the armament. A weight of about 5,000 lb. of condensers alone was noth-

ing unusual. Flashes equalling the intensity of about one million 60 watt lamps were usually produced for night photography from the air. The Navy used a similar lighting equipment during the war for signalling from shore to ship. Distances of twelve to fourteen miles were covered by combining powerful flashes with infra-red filters.

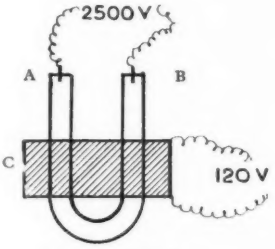

FIG. 7.

Fig. 7 is a diagram of the tube. The distance from A to B is too long for a spark to jump on its own. The tube is filled with a gas which can be made to conduct electricity. The gas is not there to be burned, but is being used as a conductor of electricity. To make the gas conduct electricity a separate electric circuit carrying 120 volts is used. Part of it forms a jacket (C) around the electronic tube. This trigger circuit of 120 volts operates through a pulse coil which steps it up 10 : 1. The amperage is low. The effect is to ionise the Xenon gas in the tube. The gas will conduct electrically. The 2,500 volts can then flash.

Use is made of this latter circuit as a control of synchronisation of the light to help make the camera " fool-proof."

Two terminals in this 120 volt circuit are included in a third electric circuit, a 12 volt one. The purpose of this circuit is to ensure that the operation of taking a photograph is reduced to the simple procedure of following a simple formula. The 12 volt circuit contains (Fig. 8) terminals at (1) the film wind on ; (2) the Iris Lever Clip ; (3a and 3b) the viewing mirror; (4) take button.

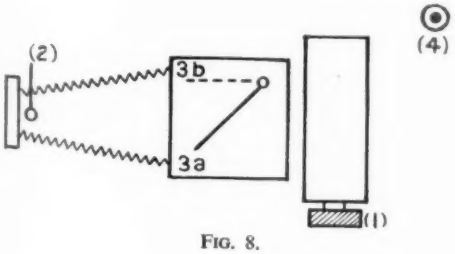

FIG. 8.

The points 3a and 3b are contained in the 120 volt circuit. The next piece of film having been wound on, completing the circuit at (1), the Iris lever being in its clip at its pre-arranged position at (2), pressing the take button causes an electromagnet to drive the mirror up from position (3a) to position (3b). The mirror in the housing is now out of the way. Points 3a and 3b having met, the 120 volt circuit is now complete. The pulse coil produces a great voltage in the jacket around the tube. The gas in the tube immediately becomes a conductor of electricity. The 2,500 volt spark flashes in the electronic tube. Immediately another electromagnet breaks the 12 volt circuit. The mirror is thrown back to its former position.

It is impossible to flash the electronic tubes and expose a film unless this low voltage circuit has been completed.

The flash is a constant so the light output is constant.

The gas does not burn. It is not being used as a filament. It therefore does not age. 10,000 flashes of constant output is reckoned as the life of one of these tubes.

Why the Xenon gas suddenly decides to stop conducting after 10,000 flashes has not yet been explained by those concerned in the manufacture of the tubes.

The filament in a photoflood lamp does get old with a resultant change of colour. In addition to the former problem of ageing was the problem of changes in line voltage of the mains supply due to the use of other electrical equipment in a large institution. This problem does not arise because the function of the power unit is to build up and store the 2,500 volts which are discharged. This process is done in about 10 seconds. The line voltage does not make much difference to the time period.

The power unit which produces the 2,500 volts consists of a transformer, rectifying valves which convert the A.C. into D.C. current and a series of condensers which act as dams to hold the electricity prior to use. A picture can be taken every ten seconds.

ADVANTAGES OF THIS ELECTRONIC FLASH TUBE

(1) Speed: Average duration 1/6000 sec.

(2) The first and the last flash of the flash tube have the same flash energy. No ageing occurs.

(3) As the flash energy remains constant so does the colour temperature.

(4) Heat emitted from the tube during the discharge can be called non-existent.

(5) The flash does not hurt the eyes. It is too fast to cause a pupil reaction.

(6) The light is " soft." It does not give hard or harsh shadows.

(7) Since one tube gives at least 10,000 flashes, the cost of running the equipment is very small. The mains supply is only used during the few seconds when the condensers are being re-charged.

Valid Colour Reproduction

To the critically minded, colour photography is an erratic procedure, and the transparencies are too often inaccurate for colour. This camera has been designed to allow for research in colour work. We must be able to produce " a valid replica " of the colour of the subject.

All who have studied this subject will have faced the fact that a clinical subject viewed in daylight, chairside operating light, and photo-flood light, will appear to have three different hues. So when viewing the picture or transparency we must bear in mind the light which originally illuminated the subject.

It is simple to produce a colour transparency pleasing to the eye by using a miniature camera colour film, photoflood lamps corrected for colour film, and a reliable exposure meter, providing that there is no movement of camera or subject while the exposure is being made. But for the photography of the inside of the mouth accurate colour reproduction of the

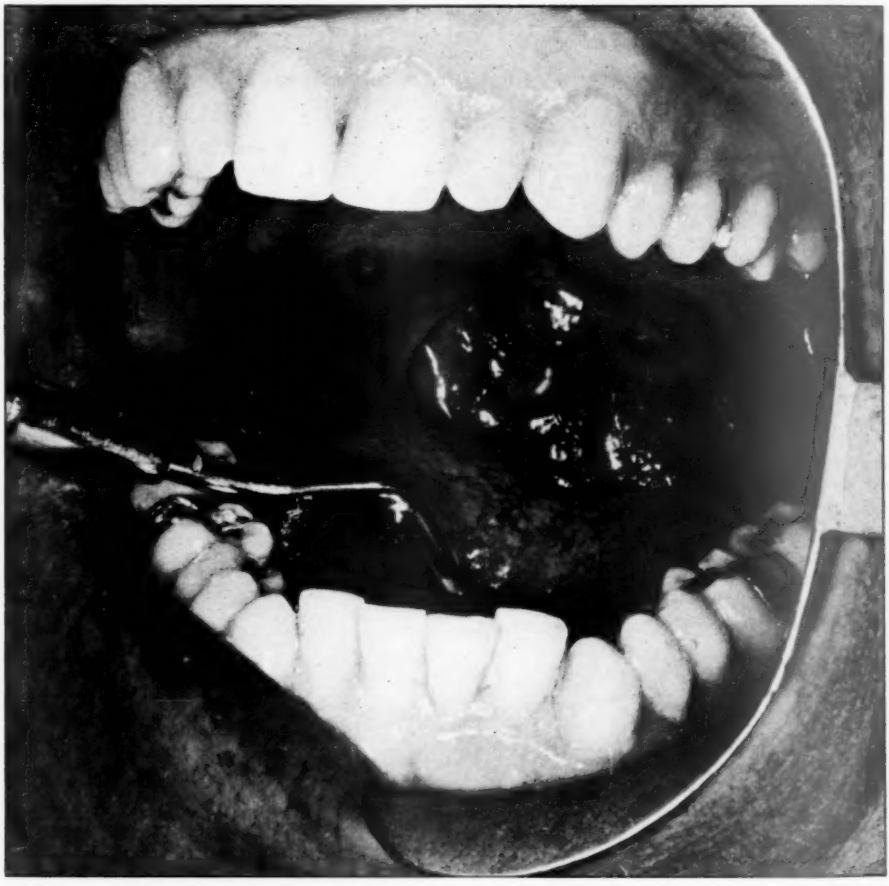

Fig. 9.—Pharynx.

colour of teeth and gingivæ, palate, oral pharynx, etc. is of the greatest importance. Here a more scientific approach is necessary, and several factors must be taken into account.[1]

Film Batch.—Colour film consists of three emulsions sensitive to blue, green, and red. These are arranged in lattice or mosaic pattern. In Kodachrome there are three layers known as a "tri-pack," supported on a safety base. Should any slight discrepancy occur in the application of these emulsions during manufacture then the resulting transparency will either lack or overstress to a slight extent any of the three colours, blue, red, or yellow, or a combination of these.

Supplied with the camera, and mounted on the power unit, is a standard grey wedge and colour chart, intended for film batch colour correction in the following way :

When a fresh batch of film is received the grey wedge is photographed on the first film of the batch, without any filters whatsoever. The resulting transparencies are then reviewed on an X-ray viewing box. A standard transparent grey wedge is placed alongside. By placing over the transparencies either one or a combination of the minus primary filters also supplied the photographed grey wedge can then be matched with the standard grey wedge. The filter or filters which effect this "matching" are the basic colour correcting filters for the rest of the batch of films.

Colour Temperature of Lamps.—Photoflood lamps are "corrected for colour," i.e. the light output is balanced to give good colour rendering with colour film. To balance the light output, the lamp filament must be raised to a certain temperature, hence the term "Colour temperature" which is measured in units of °Kelvin. This correct colour temperature depends on the main voltage supply and the age of the lamps. If the lamp is nearing the end of its life and/or the mains voltage is unstable, the °K temperature will vary and the transparencies taken will tend to go off colour. It is necessary therefore when using photoflood lamps to keep a very careful check on lamps and mains voltage.

It is claimed by the manufacturer that the electronic tube has a constant colour temperature. This factor is thus automatically cared for.

Processing.—Processing solutions may be either stale, of incorrect temperature, or developing times not always constant. The resulting spools of film will have variations in colour reproduction when returned from processing in spite of the fact that each spool was exposed under identical conditions.

Film Storage.—Cartons are stamped with expiry date of the film after which maximum efficiency is not guaranteed. Storage conditions affect efficiency of film, especially heat and dampness. Heat and damp cause swelling of the emulsions and deterioration generally.

Time Lapse between Exposure and Development.—A spool of film must not be allowed to remain in the camera for any great length of time, or allowed to be left around after exposure and before processing.

Viewing Conditions.—All transparencies should be reviewed under the same conditions. i.e. standard light source in viewing box or projector.

Exposure Factors.—There are two groups of colour in the mouth. The red group is associated with the soft tissues. The pale yellow group is associated with the teeth. These two absorb very different quantities of the light which strikes

[1]The following remarks must not be used as an excuse for badly taken pictures. The manufacturers are as keen on accuracy as we are.

INTRA-ORAL EXPOSURE CHART

Subject	*Study of Tooth*	*Study of Gingiva*	*Area*	*FILM* *Kodachrm. Daylight*	*Ilford Pan F.*	*Kodak Pan X.*
				IRIS MARKING		
Two upper centrals	tooth	—	⅝" × ½"	64	93	96
	—	ging.	enlarged	45	64	96
One molar tooth	tooth	—	two	45	64	96
	—	ging.	times	32	45	64
Twelve incisors (in occlusion)	tooth	ging.	1½" × 1"	45	64	96
Molar group of teeth .. ... (occlusal view one jaw)	tooth	ging.	subject and image same size	45	64	96
Upper arch (complete in mirror)	tooth	ging.	3" × 2"	45	64	96
Lower arch (complete) ...	tooth	ging.	image half	45	64	96
Tongue (protruded on chin)...	—	—	size of	32	45	64
Oral Pharynx (dental arches and lips also in focus) ...	—	—	subject	32	45	64

them. The red absorbs 80 per cent while the pale yellow 20 per cent. The table on page 323 shows how this has been allowed for in very close photographs.

Conclusions

(1) All the essential conditions for the photography of small areas and deep recesses have been assembled in this unit camera.

(2) The operation has been reduced to simple steps making it possible to use the equipment without a prior knowledge of photography.

(3) The tremendous increase in the lighting output has increased the depth of field available to cover adequately all dental requirements.

(4) The light output being standard, the consistency of colour in transparencies is a constant.

(5) The production of valid colour is made more possible by eliminating one more variable—the variation of the colour temperature of the light source.

Acknowledgments

The principal author wishes to acknowledge the help of many friends during the past twelve years. In particular General A. B. Austin and Colonel S. H. Woods of the Royal Army Dental Corps for permission to develop this work in the war years; Mr. F. S. Warner and the Dental Council at Guy's Hospital who financed the production of the prototype which has been in use there for seven months. Also an earlier assistant Mr. J. L. Mayes; Mr. R. Channon and Mr. W. Buckstone of the Kodak Company, London, for advice and assistance; G. H. Williamson's Photographic Appliances Ltd., Wheatley, Oxford, who devised the tri-circuit fool-proof operation and constructed the prototype.

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DIRECT CAPPING OF THE PULP AND VITAL AMPUTATION

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In approaching the problem of pulp preservation and avoidance of apical infections, two operations have lately assumed increasing importance.

(1) Direct capping of the pulp.

(2) Vital amputation.

"Direct capping" of the pulp is a procedure by which the accidentally exposed pulp is given a chance to seal the exposure and maintain full vitality.

In "vital amputation" the coronal part of the pulp is removed, whilst the radical part remains, and by maintaining its vitality, produces a new pulp chamber.

History

Attempts to maintain the vitality of the accidentally exposed pulp are not a new feature in the history of dentistry. Pfaff tried to solve this problem in the middle of the eighteenth century. Many other workers tried to do the same, e.g. Taft, Keep, King, Brown, Walkhoff, Rumpel, Hentze, Szabo, Hermann, Manley, and others.

Vital amputation is of more recent origin. This operation is now essentially aseptic, but was preceded by attempts to solve the problem by antiseptic methods. Later when the physiology and pathology of the pulp were better understood, drugs of a less irritant nature were introduced. Many famous names in dentistry were involved in this problem—for and against vital amputation. To mention a few only—Davis, Datwyler, Aisenberg, Peckert, Rebel, Pallazi, O. Mueller, W. Hess, Zander.

The arguments against vital amputation were based on the assumption that the pulp is unable to react like other tissues, because of its inability to expand, even following aseptic inflammations, because it has no lymphatics to drain the toxic products of surgical intervention. Students who are interested in this topic should read the recent publications of W. Hess, Castagnola, and Zander and Glass.

Provided a satisfactory method could be found, the arguments in favour of vital amputation are overwhelming. By maintaining the vitality of the pulp, periapical infections and the numerous difficulties of other methods of root treatment can be avoided. This refers to

the wide open apices of growing teeth, ramifications of the apical root end, difficult access, accidents—such as penetrations, or broken needles, etc. Also, if this treatment fails, it is still possible to resort to the usual methods—of either mummification or extirpation and root filling.

Much research on pulp capping and vital amputation has been undertaken by the Zurich school, and a mass of statistics has been compiled on the subject. Both these methods have now advanced beyond the experimental stage and we feel that if they are introduced into daily practice, they may prove of great importance.

FIG. 1.—Direct capping of the pulp with Calxyl. Three months after exposure of pulp—pulp tissue normal, the exposure is closed by a layer of newly formed dentine.

FIG. 2.—Higher magnification of inset of fig. 1. Layers of odontoblasts, predentine and newly formed dentine, pulpal tissue normal but slightly hyperæmic.

MEDICATION

All drugs causing the slightest irritation must be discarded; the only drugs to be used are those which can be tolerated by the pulpal tissues, and, in addition, stimulate their reorganising power. It seems most appropriate to call such drugs biological.

Ivory Powder.—This has been advocated by the Basel School (O. Mueller) and has been used for a considerable time. The material used to cover the pulp consists of finely powdered sterilised ivory, mixed into a 5 per cent solution of Vioform in alcohol. Cases taken at random for microscopical follow-up after one year show up to 55 per cent satisfactory results. Clinically the results seemed much better—80 per cent (Studer, H. Mueller, and Zeltner).

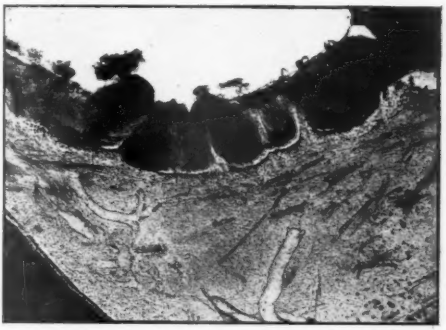

FIG. 3.—Direct capping of exposed pulp with Calxyl 83 days after operation. Layer of odontoblasts, predentine and new dentine, pulp normal.

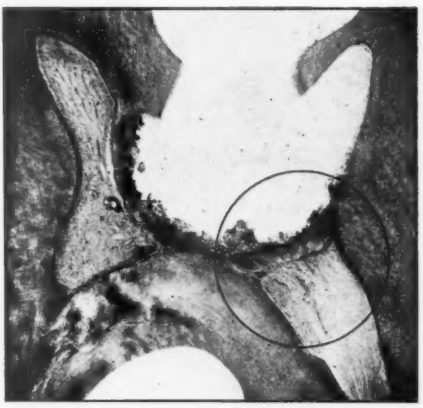

FIG. 4.—Vital amputation (right), capping (left). 83 days after operation newly formed dentine seals the pulp everywhere.

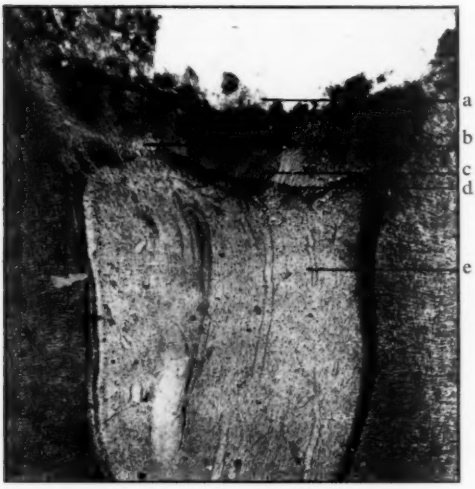

FIG. 5.—Higher magnification of inset in fig. 4. a, newly formed dentine with Calxyl residues ; b, new tubular dentine ; c, predentine ; d, odontoblast layer ; e, normal pulp.

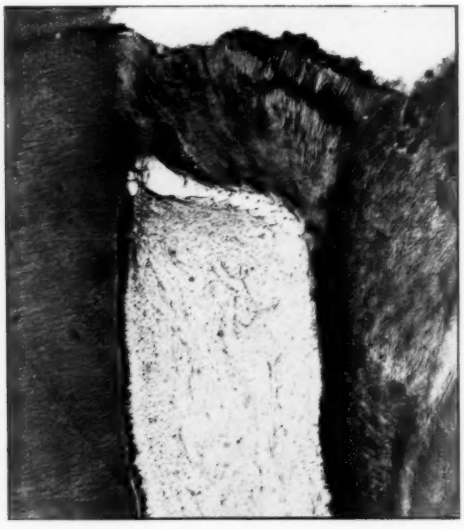

FIG. 6.—Vital amputation of 8| with Calxyl. Five years and two months after operation. Age at operation 36 years. Very thick layer of newly formed dentine. Odontoblast layer shows vacuolisation. Pulp tissue normal.

Dentine Splinters and Powder.—One of these methods uses the dentine of the operated tooth itself, but the sterility of the splinters appears to be rather doubtful. The experiments of Orban, Hellner, Feldman, Neuwirth, Willner and Hoffman have, however, shown clearly that sterilised dentine powder gives excellent results. The great drawback is the difficulty of sterilising the powder and keeping it sterile, even if colloidal silver is added.

FIG. 7.—Vital amputation lower second molar with Calxyl. One year and nine months after operation. Age at operation 19 years. Thick layer of dentine sealing the amputation, regular dentinal tubules, predentine, odontoblast layer and pulp normal.

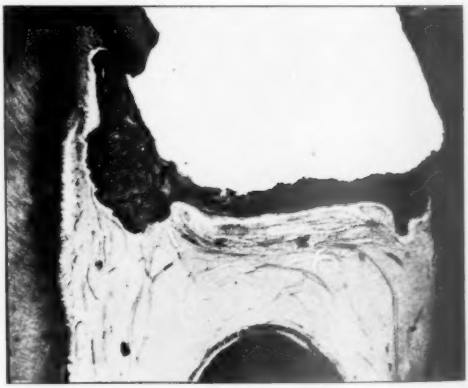

FIG. 8.—Capping of the pulp with Calxyl. Five years after operation. Complete seal with new dentine, pulp normal.

FIG. 9.—Radiograph taken immediately after vital amputation of pulp of $\overline{4}|$.

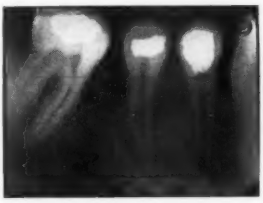

FIG. 10.—Follow-up radiograph of case in fig. 9 taken Six months after operation, showing newly formed dentine.

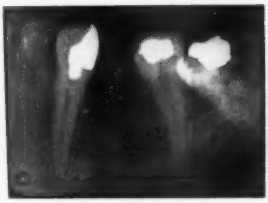

FIG. 11.—Vital amputation of pulp of lower canine showing formation of new dentine. Five months after operation.

Calxyl, Serocalcium, Dentinigene.—Calxyl is the original preparation, and Serocalcium is a Swiss product, made when the war interrupted the supply of the German Calxyl. Dentinigene is a French product. These three have, for practical purposes, the same constituents.

Calxyl is a white, slightly radio-opaque paste, composed of calcium hydroxide, $Ca(OH)_2$ with some salts of the human blood serum $NaHCO_3$, $CaCl_2$, KCl; its pH is about 11. The serum salts bring about a better toleration of the $Ca(OH)_2$ with its high pH of more than 12.

Hermann introduced Calxyl many years ago, and showed its high bactericidal action, which is believed to be due to its high OH ion content. The alkalinity is important not only because of the bactericidal action, but because—according to many authors—this fact influences the healing of the injured surface of the pulp favourably. According to Czernyei and Fischer, the pulp has a slight alkaline reaction, similar to any other healthy tissue. Any inflammation results in a shift towards acidity. Neutralisation of the acid by-products which follow an injury will facilitate healing. In addition to this, calcium has, according to some authors, a stimulative influence on the odontoblasts. The local surplus of calcium should also facilitate the sedimentation of $Ca(PO_4)_2$, by the alteration of the factors of the Ca-P solubility product. In connection with this it should be noted that the optimum pH for phosphatase is about 9·5—not far from the pH of Calxyl. According to Glass and Zander, using $Ca(OH)_2$ alone, a sharp demarcation line of basophilic calcium proteinate separates the necrotised injured tissue from the viable tissue practically immediately after the operation. In a matter of fourteen days after the operation odontoblasts and matrix can be detected below the layer of calcium proteinate, and four weeks later the odontoblast layer is continuous. Cappings with these materials gave over 90 per cent good results, while amputations gave just below 90 per cent good histological results. (*See also* Sutter, Zander, Berger, Fenner, Peter, Hoffmann, Kundert, Pajarola and Castagnola.)

Many other materials have been tried for the same purposes. To name some of them: Pulpatect (Münch and Flohr), Vitapulp (Flohr), Endoxyl (Champion and Kaegi), Citronellol (Bernard and Baechtold). None could stand comparison with the Calxyl drugs.

Pulpatect (*Münch*) is a paste composed of several inorganic calcium salts, mixed with pulverised bone-marrow of embryonic calves, and vitamins.

Vitapulp (*Flohr*) consists of calcium salts with sterilised dentine powder.

Endoxyl (*Champion and Kaegi*) is supplied as a mixture of two parts, the end-product being composed of calcium hydroxide, basic calcium di-phosphate, calcium gluconate, and calcium glycerinophosphoricum.

Citronellol (*Bernard and Baechtold*) is a pure chemical with the following formula:

$$CH_2\text{–}\underset{\displaystyle CH_3}{\underset{|}{C}}\text{–}CH_2\text{–}CH_2\text{–}CH_2\text{–}\underset{\displaystyle CH_3}{\underset{|}{CH}}\text{–}CH_2\text{–}CH_2OH$$

having an alpha and beta isomer. It is an alcohol and an aliphatic terpene. It is found in oil of roses, oil of geranium, and pelagonium. It is used in either the pure state, or as Bernard's preparation Gomerol, which is oleum niaouli and Citronellol. It is a very powerful disinfec-

tant. Care must be taken that it is free of its aldehyde citronellol, which is a very powerful irritant.

Lately experiments were made with sulpha drugs and antibiotics. So far the results have been inconclusive.

Indications

Direct capping of the pulp is indicated in all cases in which, in the attempt to excavate the softened dentine, the pulp is accidentally exposed —without deeper penetration into the pulpal tissues themselves. Vital amputation is indicated where such penetration is deeper, or where a deeper penetration can be expected. Other indications are as follows: hyperæmic pulps, the frequent accident of broken incisors in children, treatment of deciduous teeth, cases where survival of the pulp could not be expected because of extensive excavations, or the grinding for crowns (Slack, Zander, Peter, Hoffmann).

Even inflamed pulps may heal after the removal of the toxic cause, and Calxyl application—as long as the pulps are not actually infected (Kirsten, Hoffmann).

It is to be hoped that advances in diagnosis, especially ability to differentiate between coronal and radical pulpitis, and an improved technique, will increase the possibilities of this treatment.

Although it is possible to achieve good results even if the pulp has been inflamed, we still refrain from performing vital amputation on teeth with a history of advanced inflammation. So far cases in these categories have only led to disappointment. Serous pulpitis and partial pulpitis seem at present to constitute the limiting line beyond which vital amputation is unlikely to succeed. Contra-indications are general debilitating diseases, chronic pulpitis, advanced parodontal disease, and poor mouth hygiene.

Age is no contra-indication, nor are multi-rooted teeth, although they bear the additional risk that failure in respect of one canal may vitiate the successful treatment of the other canals.

Technique

Capping.—In cases of accidental exposure, the tooth should be put under rubber-dam immediately, and all operations should be continued under aseptic conditions. If such an event is foreseen, it is best to start the treatment under rubber-dam. After removal of the decayed dentine, the exposure should be examined. When probing the danger area, care should be taken not to turn a near exposure into a real one. Careless probing may result in an accident —i.e. the fine point of the explorer may catch in the exposure, or in the last, still soft, predentine covering the pulp. Low speed in drilling will avoid heat injury. Overheating above approximately 150 Fahr. may injure the pulp beyond repair. Frequently it will be necessary to decide whether some soft, but structurally good dentine, should remain on the floor of the cavity. Opinions vary, but many authors report that these layers are sterile, or that the bacteria will die under well sealed fillings. Tomes' fibres will heal more readily, even in such cases of indirect capping, if they are protected from irritation by an alkaline layer of Calxyl. In cases of deeper penetration it is better to decide to carry out vital amputation.

If, however, the exposure is a superficial one, the cavity is rinsed with a 2-3 per cent solution of Calxyl in sterile water, dried by warm air—avoid blowing infection into the cavity—and by cotton-wool pellets. It is important to rinse the cavity with a drug of the Calxyl group, and not with any antiseptic or irritant drug. The exposure is covered with a small amount of Calxyl, this is pushed gently towards the depth of the cavity, without the use of pressure, care being taken to see that the Calxyl does not extend to the walls of the cavity.

A layer of creamy eugenol-zinc oxide is applied over the Calxyl, again without using any pressure. This will harden immediately when brought into contact with Calxyl, and is covered in turn with oxyphosphate cement.

The only likely complication is bleeding from the exposure. Calxyl, however, acts as a styptic. In such cases, therefore, the first application should be washed off, and the exposure covered immediately with fresh Calxyl.

Vital Amputations.—After having secured sufficient anæsthesia, preferably by infiltration to lessen the bleeding, and after excavating the gross decay, scaling and cleaning the tooth and its neighbours, rubber-dam is applied. The cavity and the whole area of operation is swabbed with 5 per cent iodine. From this point on, the operation is performed on strictly aseptic lines. The cavity is widely opened, the caries is removed, and the best line of access is gained. When approaching the pulp the drills and instruments are changed to a sterile set. Before opening the roof of the pulp chamber, the cavity is swabbed with sterile water. Then, with a new set of sterile instruments, the roof is pierced and removed, and the pulp amputated, care being taken not to tear it to pieces. For this purpose instruments and burs must be sharp—longshank excavators and longshank rose burs mounted on a miniature contra-angle

handpiece are the most convenient. After clearing out all remnants of the pulp from the chamber, the pulp in the canal is amputated just below its emergence into the chamber. In multi-rooted teeth the orifice must be slightly enlarged. In single-rooted teeth, where there is no distinct transition, the level of amputation should be the level of the bony alveolar border—this level being chosen to ensure that secondary caries will not endanger the remainder of the pulp. If hæmorrhage disturbs the operation, Calxyl will act as a styptic.

The lesion is now covered with Calxyl, so that a small heap is visible above the orifice. The Calxyl is covered with creamy eugenol-zinc oxide, and this in turn is covered with oxyphosphate cement. By using the Baldwin method, an immediate amalgam filling can be made.

It is possible to tell, in a few days' time, whether the operation has been successful or is a failure. If, after three to four days, the patient feels discomfort, failure can be assumed, and root treatment should be started. If there is no discomfort, success may be anticipated, although radiological and vitality controls should be made at intervals of six months.

Histology

The ability of the pulp to react favourably to capping and vital amputation, provided that there was no infection, and the right technique was used, has been adequately shown by many workers (Hess, Mueller, many of their pupils, and Zander). The pulp remains vital, organises itself in a reduced pulp chamber, forms a new seal of dentine below the Calxyl, and produces a new layer of odontoblasts. The outermost layer is fibrillar, and contains enclosures of Calxyl and dentine splinters—apparently pressed into the wound in the course of the operation. Below this layer there is tubular dentine, and between this and the odontoblast layer, predentinal uncalcified matrix is visible. The odontoblasts are normal in appearance, and sometimes vacuolisation may occur. The pulp itself looks normal. Sometimes hyperæmia may be found. In patients over 30 years of age calcific deposits, vacuolisation, reticular atrophy, and other signs of regression may be found. Such findings are, however, regular features of many ageing pulps, and research at the Zurich Clinic proved that pulps with such affections react favourably to the two operations, and remain vital for many years. Recent research by Zander shows that healing starts immediately after the application of Calxyl, and reorganisation can be detected as early as the day after the amputation.

Statistics

Only a few comparative statistics will be given: Hoffman reported in 1937 on results obtained by capping with dentine splinters. Three to four months after operation, he examined 45 teeth of patients, aged 11–25, which had given no sign of discomfort, and showed no appreciably altered reaction to induction current (limit 2/15ths). 60 per cent showed complete sealing with a continuous odontoblast layer, a further 15 per cent had a continuous odontoblast layer but there was some round-celled infiltration. In 7 per cent of the cases the seal was incomplete. Only 18 per cent of the cases showed inflammation. The result in 82 per cent of cases was, therefore, good.

Berger 1944. *Vital Amputation with Serocalcium.*—Twenty-two teeth were treated, 11 of the patients were under and 11 over 20 years of age. The series included cases of hypersensitive dentine, hyperæmic and slightly pulpitic teeth. Clinically only one tooth had to be devitalised, and one other showed irritation after two days. Radiologically 21 teeth were normal after two months to two years. Histologically 20 teeth showed complete seal and continuous odontoblasts and normal pulp. One tooth only showed signs of slight inflammation.

Peter.—Thirty-one deciduous molars were treated in children aged 7–9½ years, twenty-five were examined histologically, and 62 per cent were found to be satisfactory. This comparatively poor result is attributed by the author to the difficulties of treating children's teeth. The obvious advantages are the simplicity of the treatment, and that it does not disturb the function of the resorbent organ.

Hoffmann. Vital amputation of forty inflamed pulps.—Histological examination gave 80 per cent good results. The author believes that differential diagnosis between coronal and radical pulpitis would bring about greater progress.

Kundert. Examination of sixty six-year molars.—These were extracted for orthodontic purposes after being treated. Clinically and radiologically all could be classed as successful. Histologically 85 per cent were fully successful, 15 per cent showed slight inflammation, but even in these new dentine had formed.

Pajarola. 1940.—Ninety-four teeth were examined, 56 of the patients were under 20 years of age, 34 between 20 and 40, and 14 were over 40 years of age. Two-thirds of the teeth were molars, and examination was made three to nine months after the operation. All the teeth were satisfactory on clinical and radiological examination. The teeth were divided into four groups:

A (1).—Eleven with healthy pulps opened under sterile conditions through sound dentine.

A (2).—Eighteen with healthy pulps opened under sterile conditions through carious dentine.

B (1).—Thirty infected pulps (accidentally contaminated by saliva).

B (2).—Thirty-five infected pulps, inflamed before operation (18 hyperæmic, 10 partially pulpitic, and 7 chronic pulpitis).

Of group A (1) all 7 teeth which were examined histologically showed excellent results, as did all the teeth in group A (2) which were examined histologically. The same can be said of the teeth in group B (1) but some showed hyperæmia. In group B (2) 11 teeth were examined, all showed a new complete seal, but an incomplete odontoblast layer, and three had slight inflammation.

The weakness of these statistics is the short interval between operation and follow-up. Fenner made a long time interval follow-up after two to five years of patients treated in the Zurich Clinic consecutively during one term. The age of the patients varied between 16 and 70. The drug used was Calxyl. Results were satisfactory in 93 per cent of the cappings and in 87 per cent of the cases of vital amputation.

Conclusions

Research done in the Swiss dental schools, especially that done in Zurich under Prof. Dr. Hess and in Basel under Prof. Dr. Mueller, has proved that direct capping and vital amputation have an important place in modern preventive dentistry. Basing their conclusions on this research, the Zurich Dental School recommend Calxyl or Serocalcium as a covering drug. The, otherwise equally good, dentine-splinter method has the disadvantage of difficult sterilisation. The School advise against Pulpatect, Ivory powder, Vitapulp, Citronellol, etc. The method can be used for old patients, although the best results will be achieved in the young—this is true, of course, of nearly all surgical operations. Although the methods can be successful even if the pulp is contaminated with saliva, rubber-dam and sterile conditions are essential. It appears, at present, that cases with more than a partial pulpitis are not likely to respond successfully to either operation.

The high percentage of success is due partly to the specific powers of Calxyl, but chiefly to the high regenerative possibilities of the pulp. The belief that a pulp once injured is a lost one should be discarded.

Definite progress in conservative dentistry can be achieved by introducing direct capping and vital amputation of pulps into routine practice.

Acknowledgments

The photomicrographs, figs. 1–8, are from the collection in the histological department of the Zurich Clinic by kind permission of Professor W. Hess. The radiographs, figs. 9–11, have been kindly lent by the Conservation Department of the Dental School of Zurich University.

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SHORT COMMUNICATION

FOREIGN BODY IN EAR CAUSING TRISMUS AND SEVERE PAIN

By WM. FREDK. PYE, L.D.S.Edin.

The patient, a female aged 20, presented herself for examination, complaining of pain and trismus in the right temporomandibular joint.

Clinical examination showed that the wisdom teeth were not at fault ; the dental condition was as follows :

$$\frac{87\ 54321 \mid 12345\ 78}{8\ 654321 \mid 12345\ 78}$$

General oral condition was very good.

The patient volunteered the information that her doctor had been treating her for rheumatism of the joint over a period of twelve months, with no improvement, and finally suggested a dental examination.

Suspecting possible bony change in the right temporomandibular joint, I had it X-rayed. This revealed a spherical opaque foreign body lying deep in the external meatus against the tympanum.

Lateral radiograph two-thirds size.

The patient was referred to hospital, and under a general anæsthetic the foreign body was removed. It proved to be a glass bead which had been inserted during early childhood.

The patient is now perfectly well and free from any recurrence of her previous symptoms.

Orthodontic Note

The Role of Observation and Simple Treatment in the Practice of Orthodontics

This paper includes the following case reports :

Case 1.—In a girl, aged 10–6, an upper canine was erupting and was just caught lingual to the lower canine. The patient was placed under observation and at the end of two years the relation of the two canines was normal.

Case 2.—A girl, age 6. The lower laterals were erupting in lingual position in the arch in which the space was insufficient. At age 10–0 the alignment was excellent.

Case 3.—A woman, age 34, had her upper centrals lingual to the lower incisors and the latter were beginning to chip. The patient could bite edge to edge. The wooden tongue blade corrected the condition in two weeks, the patient being instructed to use the blade, in as vertical a position as possible, with a little force, about 75 times, three times a day, to press the upper incisors labially and the lower ones lingually.

Case 5.—A boy, age 18, had a typical Angle's Class III malocclusion with spaces between the lower first premolars and canines. It was, however, easy for him to occlude the incisors in an edge to edge position. The condition was treated by a lower plate carrying an inclined plane for the upper incisors to bite on. The plate was cut away behind the lower incisors and it carried a labial wire with loops to close the spaces.

Case 6.—A girl, age 6–6, a Class III case with a medial displacement of one-third of a cusp, had her upper centrals lingual to the lower incisors, she could bite edge to edge. The case was easily corrected with a lower plate with an incline to move the upper permanent centrals labially as in Case 5. The plate was trimmed on the lingual surface and a looped labial wire was incorporated in the plate to move the lower incisors lingually. The patient was instructed to bite on the plane as frequently as possible ; in three weeks the case was corrected. It is important in these cases to watch that all the laterals erupt into good positions and relations.

Case 7.—A woman of 20–0 complained of pain in the upper right molar region ; it was found that the third and second upper molars were entirely buccal to the lower molars ; the condition was corrected by banding the four molars, the upper ones having buccal hooks and the lower ones lingual hooks which were connected with rubber bands ; these were worn at all times except for eating. At the end of a month the relations were almost corrected and the discomfort had gone.

Case 9.—A girl, age 7, had a bad habit of rolling her tongue and thrusting it into the region of the upper anterior teeth, causing an open bite. Talking to the child did not lead to a cessation of the habit, so an appliance was put in with vertical spurs, rather long, to prevent the undesirable tongue movement. The appliance was worn for just over six months, without any inconvenience, except that at the beginning the tongue became very sore. The use of an appliance to break habits seems to be a reasonable procedure but the use of pain and fear is definitely rejected by psychologists. In this case, although pain was caused, apparently there was no psychological damage.—Shenan, H. L. (1950) *Amer. J Orthodont*, **36**, 1.

BRITISH DENTAL JOURNAL
JUNE 16, 1950

BIRMINGHAM

THIS year will celebrate the fourth annual meeting of the Association to be held in Birmingham and the 70th anniversary of the former British Dental Association.

Birmingham, to-day, the second city of England, chief hardware centre of the world, offers a green and pleasant welcome to visitors with its parks, pleasure grounds, art gallery, theatres, libraries and museums, where ample variety of interest for refreshment of mind and body may be found. More perhaps than any other city, it owes its name and fame to two families, both strangers to it by birth. It is true there existed an Anglo-Saxon settlement in this centre of the country before the conquest, since it is mentioned in the Domesday Book valued at twenty shillings, not a very handsome gift to the Norman Bermingham whose name was bestowed upon it. From this small beginning, it has progressed with typical British sturdy perseverance to the thirteenth century, when it was regarded as a fair market town and a centre of traffic where many several ways met at the Bull Ring. Travellers noted the sound of hammers as they approached the town "where many smithes in the towne that use to make knives and all manner of cuttynge tools." It was early recognised as an industrial centre, and with other towns of like description in the time of the Civil Wars, it sided with the Parliament, suffering as a result from the hand of Prince Rupert, but, with that spirit typical of the place, it recovered and persevered on the old lines, rather of the slow but sure variety, until impetus was received from the arrival of that other later benefactor, Joseph Chamberlain, to whom Birmingham owes so much of its fame and its position in the world to-day. Entering the firm of Nettlefold, his influence made itself felt at once in the business and, from the prosperity accruing as a result, Chamberlain was able to transform the city, clearing the slums, widening the streets, giving to the citizens better sanitation, housing, parks, libraries, art gallery and, above all, the idea of a university arising from the existing Mason College and the older Medical School, Queen's College.

The result of these activities appears to-day in the 1,500 distinct trades which give to the modern city its world-wide reputation. These have attracted to it a whole population of skilled craftsmen, and made it, inevitably, the centre for the production of munitions of war, and a less pleasing attraction for enemy aircraft. Birmingham suffered at least 100 air attacks, with consequent devastation of houses and important buildings with serious loss of life and many severe casualties. Too much praise cannot be accorded to the defence organisation in the city which kept industry in being, producing the required amount of war material. The spirit of the citizens was magnificent. Recovery has been remarkable and a new city is rapidly rising from the destruction of the old. The University, of which Joseph Chamberlain was the first Chancellor, instituted in 1900, was the first to grant degrees in commerce and industry, such as brewing. Dentistry has benefited in that Birmingham was the first university to grant dental degrees, setting an example which has been followed quickly by the newer universities, more slowly and more recently by the older ones. The buildings to house the faculties, situated pleasantly at Bournbrook and Edgbaston already make an imposing appearance—a promise of a noble whole. It will be in the memory of some of the older members who attended the meetings in 1909, when H. R. F. Brooks was president, how great was the interest shown in the new buildings and the faculties demonstrating their various industries. Sir Oliver Lodge, then Principal of the University, received the members and gave dignity to some of the meetings by his presence. The new dental school, so much admired so many years ago, about which a member was heard to remark that it would be old fashioned in twenty years' time, has fulfilled that prophecy through no fault of its governors. Desire has outrun performance due to the "times disconsolate," but there is great promise in the preparations which, though frustrated, are being renewed.

Another great benefactor to the city and a native of Edgbaston, George Cadbury, has been responsible for the works and village at Bourn-

ville. This firm has a special interest for the dental profession in that the problem of the teeth of the adolescent was solved so far as the firm of Cadbury was concerned. It was an example followed by other enlightened companies. This solution was a rule that the entrant to the factory must agree to dental treatment up to the age of 18, and this treatment, being compulsory, was free. The firm has now presented to the city a pleasant piece of land near the new University at Edgbaston to be used for recreation.

Religious interests are not neglected; Birmingham is a bishopric, and has a cathedral and another Roman Catholic cathedral, many churches, Methodist halls and Unitarian meeting places. There have been religious revivals, especially at the time of John Wesley when he had "an exceeding large congregation" in what had been a playhouse; the mob gathered "throwing stones and dirt". With characteristic courage, the congregation remained steadfast and refused to be diverted. An interesting note at this meeting was that one, George Bridgins, 107 years of age, "venerable monument of antiquity still walks to the preachings." The New Meeting in Moor Street is associated with Joseph Priestley.

Birmingham solved its water problem by going to Wales where there is a chain of reservoirs in Radnorshire; these works were opened by Edward VII in 1904, and cost £6,000,000.

The country around the city is rich in beauty and historical interest, more so perhaps in the latter respect than any other part of the country, for it contains the shrine of the greatest poet at Stratford-on-Avon, with the Forest of Arden leading up to it. There is the city of Warwick with its castle and all its wealth of history, and Kenilworth. There are the Lickey Hills, Malvern and, to the north, Cannock Chase. All these, and more, offer a wealth of enjoyment, and the excursions which have been planned to assist in this, provide an added attraction to the more professional interests of the meetings. These should appeal to many members, particularly those who are not already familiar with this typically English countryside.

NOTES AND COMMENTS

The Expense Ratio

It is interesting to note in connection with the expressed intention of the Ministry of Health to undertake an investigation into the expense ratio in dental practice that a recent survey carried out by Accounting Corporation of America of the returns of 53 dentists showed that the average annual expenses were 52·55 per cent of gross income—almost exactly the assumed percentage on which the original N.H.S. scale of fees was based. The average gross income of these dentists was $18,000. Comparable figures for physicians showed an expense ratio of 40·15 per cent.

Dental Institute, University of Bâle

The second volume of Odonto-stomatologie (Verlag Birkhäuser, Bâle, 20 Swiss francs) entitled "Zahnmedizin" celebrates the twenty-fifth anniversary of the Dental Institute of the University of Bâle. Although this is the oldest Swiss University, its dental institute is the most recently founded, having been preceded by those of Geneva, Zurich, and Bern. The Institute was originally independent of the medical faculty but in 1937 became included in it, its professors then becoming professors in the University. Like so many dental schools at present the Institute is very short of accommodation and it is hoped that more will be obtained by removal of a school dental clinic from the premises and acquisition of a further house. The jubilee volume written in the German language contains eighteen articles on all aspects of dentistry by members of the staff of the Dental Institute and other institutes of the University. It worthily celebrates an important occasion.

Marks and Spencer Ltd.

The Dental Services of this company have been noticed in the columns frequently but of late there has been some alteration in the method of working. This was natural, for the State Health Service, which has had such a profound effect on all dental practice, did not leave this excellent scheme untouched. The report which, it is hoped, will be published shows how the adaptation to fit into the State Service has been accomplished. The scheme has consistently followed lines of prevention by the encouragement of early attention with continued inspection and treatment. It has always been a satisfaction in studying these reports to note how the number of carious cavities diminished and also that the teaching in oral hygiene had a marked effect in the increase in dental fitness among the members.

Dental Hygienists in America

It is reported in the *A.D.A. News Letter* for April that Virginia had become the forty-sixth State to licence dental hygienists to practise, leaving Texas and New Mexico as the only States in which there is no provision for such practice. In most of the States hygienists are permitted to make topical application of fluoride solutions to the teeth in addition to carrying out scaling and polishing.

Identification of a Conspirator

The Earl of Manchester, English ambassador to the Court of Louis XIV at the time of the intrigues for the return of James II, reported to the authorities at home that "Captain Robert Maxwell has just left Saint-Germain with letters for Scotland, he knows the whole secret affairs of that Country and may be identified as he wants two teeth before."

Fifty Years Ago

From the "Journal of the British Dental Association," June 15, 1900.

When, therefore, Mr. T. R. Jessop gave me my first jaw case, which was one of Symes' operation for removal of the tongue, followed by non-union at the symphysis, I determined to use the dental engine. With this object I had several long drills made with different shaped cutting edges, and I found the bayonet shape the best. This was made to fit a dental engine, and I had a thicker driving cord added, and blocks of lead fixed to the fly-wheel to add to its power. Armed with this I approached the patient, and drilled two holes through his jaw as readily as boring through chalk. I was pleased with the result at the time, and with the success which followed in many cases afterwards. As, however, the use of the foot for treadle work is a trained movement not practised by surgeons, I consulted Mr. S. W. Cuttriss, electrician, and induced him to bring out an electrical surgical motor primarily for the object of drilling any bone in the body, the removal of exostoses and general aural work, and by degrees to develop it until it could be used for trephining and any form of bone work. For drilling purposes it works very well, and on September 5 last I saw Mr. Lawford Knaggs use it with great success in a case of excision of the knee.

From a paper on "Fractures of the Inferior Maxillæ Treated by a Modified Method of Wire Suture Aided by the Electro Motor."

LETTERS TO THE EDITOR

THE PILTDOWN SKULL

Sir,—I was so pleased to see Mr. Marston's article regarding the Piltdown Skull in the current *Journal* that I was unable to refrain from breaking into verse:

Too long from Science we've been over apt
To take its theories as proven fact:
One missing link, however, now has snapped,
The Piltdown fallacy, at last, is cracked.
In each museum right throughout the land,
In every text-book we can always find
A picture of this ancient, hirsute, and
Now bu'sted ancestor of all mankind.
When looking at those wistful, dreamy eyes,
That must have scanned the far-off Piltdown chalk,
We seldom stopped to think and realise
How much of this was science poppy-cock:
For, after all, it's just a portrait, 'strewth,
Built up of bits of some parietal bone,
And someone else's mandible and tooth,
That Piltdown Willie didn't even own.
Three years elapsed: three times the Earth could travel
Around its path so long decreed by Fate,
Before again the old-time Piltdown gravel
Revealed some bits of powdered turbinate.
And now we're told the long-dead osteoclast
That fashioned Willie round his dura mater,
Compared with that which formed the lower cast,
Was born three hundred million decades later.
The grooves, the size, the shape of that parietal
From which this semi-human ape was made,
Would surely render now, you'd think, less vital
The ravings of the Huxley Old Brigade.
So why not try again to prove he's like us
Or otherwise; we're sure to understand
That if you find no trace of umbilicus
You'll know that Adam's skull is in your hand;
But 'neath that silt laid down so long ago,
On which the dust of centuries lies fitly,
You may uncover some old P.D.O.
Still waiting for his mediæval Whitley!

"*Ham-Var*",
Broomfield Rd.,
Glasgow, N.

Yours faithfully,
Jas. A. Gale.

A MODIFIED DESIGN FOR A HIGH-LABIAL RETAINER FOR KENNEDY CLASS I AND II CASES

Sir,—I feel I must point out that the writer of this note in the issue of May 19 has produced some rather muddled thinking concerning the use of this particular clasp: he appears to be under the impression that it can function both as a direct and as an indirect retainer. Its use as a means of retaining that part of the denture nearest to the tooth is well recognised, and, further, it is immaterial whether it is placed on the buccal, distal or lingual surfaces (provided there is another arm—rigid or flexible—diametrically opposite).

As an indirect retainer any clasp of this type is useless—it is too near the fulcrum. And it is the position of the fulcrum which has misled your correspondent. An examination of his fig. 1 shows clearly that the denture is expected to rotate about a point nearer the apex of the tooth. When the distal end of a free end denture tends to move away from the gum it will rotate round that part of the denture base which is furthest away from it—usually the occlusal rest. Therefore whatever position on the buccal surface is chosen for the end of the clasp it will move distally and gingivally when the free end of the denture comes loose, and it will in most cases follow the

curve of the tooth without resistance. In the case of an isolated tooth, the mesial surface might be chosen, but a wire sufficient to retain the free end of the denture would be too rigid to make a good direct retainer.

It is an accepted fact that an indirect retainer must extend beyond the clasped tooth preferably to a distance at least half the length of the rest of the denture. Judging by fig. 2 (lower) your correspondent employs a Kennedy continuous clasp ; as this is one of the best indirect retainers, perhaps his success may be attributed to its use.

2, *Conduit Road*, *Bedford*. Yours faithfully, C. P. WALLIS.

EARLIER ERUPTION OF THE TEETH ?

SIR,—At a recent discussion among health visitors in Barking, visitors from Australia commented that they were struck by the apparent earlier eruption of the deciduous teeth in this country as compared with their own country. In reply the local health visitors put forward their own opinion that the teeth were being cut in this country much earlier to-day than they were, say twenty years ago; not only did this apply to the deciduous dentition but also to the second teeth, it being further suggested that this happening might be attributed to the diet.

Asked to substantiate this theory I have had to confess that I have no evidence to support it, but in normal routine I do not come across very young children until such time as the deciduous teeth are in position ; so far as the permanent dentition is concerned I have not noticed any change of time of eruption comparable with twenty years ago. Further, my own view is that health visitors are not as a rule so dental minded as to be in a position to make comparisons with twenty years ago.

As I have approached the Ministry of Health and the B.D.A. on this matter and they too are unable to offer any evidence, I should be glad if any members can either substantiate, or otherwise, this theory.

Central Clinic, *Barking, Essex*. Yours faithfully, R. A. TRAN, *Senior Dental Officer*.

Reviews and Abstracts

HAND BOOK FOR ROYAL NAVAL DENTAL SURGERY ATTENDANTS. His Majesty's Stationery Office, London, 1949. Pp. 146. Illustrations 46 (34 in appendix). Price 5s.

This book is issued by the Admiralty for the information and guidance of Royal Naval Dental Surgery Attendants. Following a foreword, which gives a brief account of the history of the Royal Naval Dental Service, the book is divided into three parts. The first part deals with the dental tissues in health and disease and contains a description of the anatomy of the teeth and the pathology of infection followed by a short description of the more common diseases of the teeth. The chapters are very brief but on the whole adequate and sufficiently accurate for the purpose intended. It is doubtful, however, whether the reader will learn much from the two pages on general pathology and the three on bacteriology.

Part two deals with the professional duties of the dental surgery attendant. This section is largely devoted to the care of instruments and equipment, sterilisation of instruments, preparation of filling materials and impression materials, and also contains information with regard to the casting of models, construction of bite blocks, conduct of gas cases, dental first aid and the taking and processing of dental radiographs. It is surprising to find in this section that pure phenol is advocated as a suitable chemical disinfectant for sterilising handpieces, amalgam carriers and scalpels, but in the main the necessary information is presented in these chapters in a clear and concise form.

Part three deals with the clerical duties of the dental surgery attendant and in this section the system followed in the Navy for records of treatment, ordering and control of dental stores, and the form of service communications, are briefly explained.

The appendix contains a list of dental equipment and stores with notes indicating their use. This section is well illustrated and should be of great value to those unfamiliar with dental instruments and equipment. However, in the column headed " use " brevity may be a source of danger particularly when dealing with drugs and materials. This column would in any case have been better headed " description."

The entire book is concise and adequate for its purpose and parts one and two should be of value, not only to naval dental surgery attendants, but also to dental surgery assistants in training for civilian practice.

Effect of Lubricating Agent and Coarse Foods upon the Cornification of the Oral Mucosa of the White Rat.—The application of olive oil to the skin of the rat has been found by another worker to prevent dehydration of the stratum corneum. It was thought that a diet with a high fat content might have a similar effect on the oral mucosa. Groups of rats were maintained upon supplemented corn meal diets. Other groups were kept on identical diets to which vegetable oil was added. After four to six weeks the rats were sacrificed. In all cases the gingiva possessed a thick compact stratum corneum but in the animals on diets containing vegetable oil the cells of the stratum spinosum were slightly less densely packed. This slight difference was confined to the mandibular gingiva. It was considered that the effect was entirely due to the lubricating action of the fat. This was confirmed by finding the same slight changes in animals on diets to which mineral oil was added.—PERLMAN, A. (1950) *J. dent. Res.*, **29**, 59.

Foreign Body in Tongue.—T. J. Hagen reports a case of a veteran who was wounded in Italy by a bullet which entered the cheek on the level of the right mandible and travelled across the mouth through the left antrum and left temple. He made a good recovery and was discharged. Ever since his tongue had been swollen—with a small fistula discharging pus on right side. The right molars were missing ; in the middle portion of the tongue there was a lump which radiographs proved to be a tooth and a fragment. The crown of a lower molar was removed together with a small fragment of tooth. Recovery was good.—(1950) *J. Oral Surg.*, **8**, 56.

Dental News

DENTAL WHITLEY COUNCIL (LOCAL AUTHORITIES)

THE first meeting of the Whitley Council for dentists employed by local authorities took place on Thursday, June 8, 1950. The Staff side presented a claim for improved salaries and conditions of service. This is to be considered at a further meeting on July 6 after the representatives of local authorities have had an opportunity to consult their organisations.

The dental representatives on the Council are Messrs. J. V. Bingay, J. J. Gillard Bishop, S. K. Donaldson, J. Fletcher, D. E. Mason, J. F. Pilbeam, A. Gordon Taylor, J. Thomson, J. F. A. Smyth and K. C. Webster. Alderman W. E. Stevens is chairman of the council and Mr. D. E. Mason Vice-Chairman. The Joint Secretaries are Messrs. A. H. Condry and L. H. Dewsbury.

SIXTH INTERNATIONAL CONGRESS OF RADIOLOGY

AN exhibition of X-ray, electro-medical and allied apparatus is being held at the Royal Horticultural Society's Halls in connection with the above Congress on July 24-28.

The exhibition is not open to the public but members of the Medical and ancillary professions will be welcome. Tickets are obtainable on receipt of a stamped addressed envelope from the Exhibition Manager, International Congress of Radiology, 32 Welbeck Street, London, W.1.

This will be the first International Congress of Radiology to be held since the Chicago Congress in 1937 and manufacturers from nine different countries will be showing their latest apparatus.

THE BRITISH SOCIETY OF PERIODONTOLOGY

THE British Society of Periodontology held an interesting clinical meeting on April 7. The subjects of the programme prove the vitality of the Society in their efforts to keep abreast of the fast-moving improvements in treatment based upon research. All aspects of science and practice were shown by table and clinical demonstrations. That such a programme was attractive was proved by the number of members attending and the interest displayed. The President, Dr. E. W. Fish, attended and expressed his satisfaction at the Annual Meeting which followed.

ROYAL COLLEGE OF SURGEONS OF ENGLAND FACULTY OF DENTAL SURGERY

A COURSE of practical demonstrations in Anatomy, Applied Physiology and Pathology in their application to Dental Surgery and in Dental Anatomy and Histology will be held at the College from July 17–28, and from September 4–29.

The demonstrations will be held in the afternoons from Monday to Friday each week, and will be given by :— Anatomy : Mr. R. J. Last ; Physiology : Professor David Slome ; Pathology : Professor G. Hadfield, Dr. H. D. Ross and Dr. I. R. H. Kramer ; Dental Histology : Professor E. B. Manley.

Fees for the Course are £21. Applications, accompanied by a remittance, should be sent to the Secretary, Faculty of Dental Surgery, Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C.2.

ERASURES FROM THE REGISTER

THE General Medical Council, acting on recommendations of the Dental Board, have instructed the Registrar to erase the names of Howard Lloyd Bevan, Llandaff North, Cardiff ; Ernest Arthur Gwynne Hooper, Brynmawr, Breconshire, and Frederick Wakeling, Sneinton Dale, Nottingham.

Mr. Bevan had been convicted at Cardiff Assizes on November 28, 1949, of obtaining money by false pretences and was sentenced to two years' imprisonment.

The Dental Board had found that Mr. Hooper had accepted sums totalling £3 10s. from three patients as part payment in advance for treatment and had failed to complete the treatment in all three cases.

In the case of Mr. Wakeling the Board had found that he had certified that certain dental treatment had been completed without taking proper steps to satisfy himself that such treatment had been completed, and that he had wrongfully claimed and received fees totalling £22, " and that in relation to the facts so proved he had been guilty of infamous or disgraceful conduct in a professional respect."

SCHOOL DENTAL SERVICE

MR. PERKINS asked the Minister of Education on May 25 whether he is aware that school children in Gloucestershire have not had their teeth examined for two years; and what steps he is taking to remedy this state of affairs.

In a written reply, Mr. Tomlinson said : " Yes. The School Dental Service has been affected by difficulties over the salaries of dentists employed by local authorities. Agreement has now been reached on the establishment of a Dental Whitley Council which is to hold its first meeting on June 8."

The Schools

Dental Students.—Mr. Hastings asked the Minister of Health on May 25 how many dental students are now under training in England and Wales ; how this number compares with the pre-war figure ; how far he regards this number as sufficient to meet the country's needs ; and what steps he is taking to increase it.

In a written reply, Mr. Bevan said : " About 2,135, including 482 who took up training during the current academic year. The corresponding pre-war figure was between 1,300 and 1,400 (estimated), including an annual intake of about 280. There is an undoubted need for more dentists, and I am sure dental schools in the United Kingdom are doing everything possible to expand their training facilities to the maximum in order to meet it."

Personalia

MR. R. J. NEWMAN, L.D.S.Eng., of Ilford, Essex, has been appointed a Justice of the Peace for the County of Essex.

BRITISH DENTAL JOURNAL

Communications with regard to editorial business should be addressed to THE EDITOR, *BRITISH DENTAL JOURNAL*, 13, Hill Street, Berkeley Square, London, W.1. Telephone: Grosvenor 2761. Telegrams: "Bridention," Audley, London.

Original Articles and Letters submitted for publication are presumed to be offered to the *British Dental Journal* only, unless the contrary is stated.

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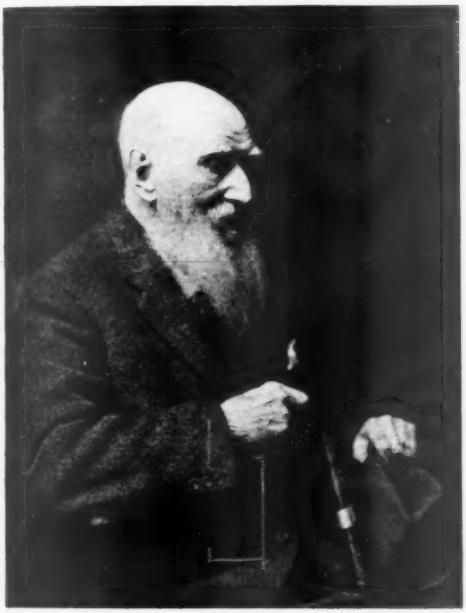
OBITUARY

WILLIAM GUY, LL.D., F.R.C.S., L.R.C.P., H.D.D., F.D.S.Eng. and Edin., F.R.C.S.E.

THE Senior Vice-President of the British Dental Association passed away on May 28. A teacher holding the post of dean of a school for thirty-four years must have affected, necessarily, the minds and to some extent the lives of countless men and women.



The strong character—the master mind of the Edinburgh Dental Hospital and School, struggling with adverse circumstances, indignant that the fees paid by students, which could have done so much for the school, had to be diverted to the support of the hospital, William Guy saw in his brilliant mind what the school might have been, it was no wonder that the frustration over so many decades caused that degeneration in the condition of the school which came to be deplored. His vision had been stimulated by the visits paid to America and the Continent as representative on the F.D.I. His gift of languages, his able and ready reasoning and argument, his unrivalled memory, made him the representative par excellence to international dental federations and congresses. He made friends with distinguished colleagues in various countries, gathering views on all aspects of his profession which added zest as well as irksomeness to his desires and their frustration for the improvement of his school. Students came from all parts of the world where today there must be expressions of sorrow for his loss and there will be reminiscences of his prowess, his wit and his hospitality.

William Guy was born in 1859, half a Scot for his mother was the sister of the well known Dr. John Smith of Edinburgh, his father was a surgeon in Biddenden in Kent where William Guy was born. The story of his life has been told in that last work of his "Mostly Memories—Some Digressions" written in his lonely old age, his wife, the daughter of John Smith, dying in 1944 after a happy married life of 49 years.

Guy began his career as a surgeon and only later joined his uncle, John Smith, in practice as a dentist—taking the L.D.S.Edinburgh. Looking back over fifty years when Guy began his teaching in the Edinburgh Dental School, a picture is conjured up of a dapper young man, in shepherd's tartan trousers and piccadilly weepers, lecturing with dramatic force, making the dull subject of materia medica lively with his wit. How in a few years, on the death of the first dean of the school, the redoubtable Bowman Macleod, in 1899, Guy took the reins. He had already made his mark in the B.D.A. and the Odonto-Chirurgical Society of Scotland. In 1912 he was president of the old Scottish Branch of the B.D.A., Vice-Chairman of the Representative Board in 1912 and again in 1921, and had the honour of being elected president of the Association at the time of the sixth international dental congress in London in 1914. When war broke out he immediately took up his work as surgeon in the R.A.M.C. in the 2nd Scottish General Hospital where his work was recognised by promotion to the rank of major.

All this time he was making his mark, notably at Belfast in 1908 where his forceful speech on dental legislation roused so much enthusiasm that schemes and committees became active for the promotion of a bill to abolish the evils of unqualified practice—as a result of the 1921 Act the Dental Board of the United Kingdom came into being and Guy was chosen as representative for Scotland on that body. He made his presence felt and his wise judgment recognised during his service from 1921–1929.

His forceful speeches and their "bons mots" are remembered and often quoted.

He instituted the first higher dental diploma and was the first to receive the honorary diploma in 1946. When the Edinburgh College of Surgeons instituted the fellowship in dental surgery he was the first honorary fellow, almost at the same time he received the honorary fellowship in dentistry of the Royal College of Surgeons of England.

Other honours came to him. At the 7th International Dental Congress in Philadelphia in 1926 he received the LL.D.Pennsylvania.

His fame was not confined to the dental world for he was a recognised wit in the Pen and Pencil Club of Edinburgh, and the Scottish Arts and Conservative Clubs. He was received with enthusiastic welcome as an after-dinner speaker and his speeches make interesting and amusing reading, revealing his wide culture and a mind eminently able "to roast that which he took in hunting."

His long life was full of works for he made contributions to his profession and made friends there as well as in other walks of life, there was wealth of exciting incident, strenuous activities of work, recreation, sport, and conviviality. He was a grand fighter and might have quoted :

"Then welcome each rebuff
That turns earth's smoothness rough
Each sting that bids nor set, nor stand, but go!
Be our joys three parts pain
Strive, and hold cheap the strain,
Learn, nor account the pang ; dare never grudge
the throe!"

LEONARD CHARLES ATTKINS, F.D.S. R.C.S.Eng.

THE death of Leonard C. Attkins (" L. C." to his innumerable friends) which occurred on Friday, June 9, came as a shock for, although his health had been indifferent for the last few years, there was nothing in his condition to suggest so early a death.

Attkins, who, throughout his life was intimately associated with Highgate, was born there in 1885. He qualified L.D.S. R.C.S. England from the National Dental Hospital in 1907 and the following year he established in Highgate Village the practice with which he was so closely connected throughout his professional life, and in which he was joined in 1920 by his brother and in 1934 by his nephew.

Eminent in his profession—he was superintendent of the National Dental Hospital in 1917 and Senior Dental Surgeon to the Royal Northern Hospital for many years—it is, nevertheless, for his unsparing activities in dental politics for which he was most widely known. He was, for fifteen years the Executive Dental Officer of the Public Dental Service Association. He was a member of the Dental Benefit Joint Committee and the Dental Benefit Council, and the Joint Advisory Dental Committee and Chairman of the Dental Consultative Committee. He had the unusual distinction of serving on two Interdepartmental Committees on Dentistry—the Teviot Committee and the Spens Committee—and more recently accepted appointment as a member of the Dental Tribunal and of the Standing Dental Advisory Committee of the Central Health Services Council.

To those who counted him a friend—and they were many—L. C. will always be remembered for countless kindnesses. He took a high view of the duties of the ordinary man and never refused an opportunity for service. At the Royal Northern Hospital he created for himself a special position as unofficial welfare officer for all the nursing staff and many social occasions will suffer for lack of him. Perhaps, however, it was his connection with Highgate Boys' Camp which most strikingly showed this side of his character. This camp, with the foundation of which he was closely associated, provides holidays for poor boys from Highgate, Islington, and the surrounding districts. Under his guidance, as Commandant, the camp acquired its own freehold ground at Pagham, Sussex, and grew tremendously both in size and stability. He was tireless in the work he did for the camp. Few of his professional acquaintances knew that, amidst all the other calls of his busy life, he devoted much of his time each winter to organising concert parties to raise funds for the annual visit to Pagham.

He was a keen sportsman—a cricketer and tennis player in his younger days, and more recently an enthusiast of bowls. Indeed it may be said that he worked hard and played hard, and though there were many who disagreed with him there were none who did not respect and admire him.

Mr. Attkins' wife died three years ago. He leaves three married daughters. To them and to his brothers the sympathies of all will be extended.

ROBERT HILL, *M.B.E.*, L.D.S.Edin.

MANY members will be shocked to learn of the death of a genial and sterling character. Quiet and retiring, Robert Hill was only known to a few but all who were fortunate enough to meet him experienced his kindly and hearty disposition. Qualifying in Edinburgh in 1903 he joined the Association in 1905 and has continued his membership until now. He was one of the happy band who went from this country to Canada in 1932. He was awarded the *M.B.E.* in 1921. It is hard to be reconciled to his passing when he seemed in his usual health at the presentation of the portrait to Mr. Wood on May 13. He was born in Falkirk and practised in York for many years. His great interest was in Architecture and he was a member of the York Archæological Society as well as the Architectural Society.

WILLIAM WALLACE, L.D.S. F.P.S.Glasg.

BY the passing of Wm. Wallace, on May 19, Glasgow lost her oldest practitioner.

He was the son of the late James Wallace who was in practice before the '78 Act and a brother of the well-known dental surgeon—Sim Wallace.

He graduated M.A., M.B., M.D., at Glasgow University and was an L.D.S. of the Royal Faculty of Physicians and Surgeons.

For a number of years he was on the staff of the Glasgow Dental Hospital and School and Professor of Dental Anatomy and Physiology at the Anderson Medical School : he was also at one time a member of the Examining Board of the Faculty.

Dr. Wallace was 86 years of age and was unmarried.

Harry Yates McCarthy, jun., L.D.S.Manc., died suddenly on May 22, at the age of 33. He qualified in 1938 and held a commission in the Royal Navy from 1939 to 1946, reaching the rank of Surgeon Lieutenant-Commander (D). After being demobilised he was assistant school dental officer at Grimsby until 1948 when he joined his father in practice at Darwen. He leaves a widow and two children.

Births

BINGLEY.—On June 2, 1950, to Kathleen (*née* Silas), L.D.S. R.C.S., wife of Derek Bingley, Maltravers Drive, Littlehampton, a daughter (Elizabeth Jane).

PEEL.—At the Mayfield Nursing Home, Salford 7, to Sheila, wife of John Peel, L.D.S.Manc., a son (John Douglas)—a brother for Sheila. May 28, 1950.

PLOWMAN.—On June 3, 1950, at the Shiel Nursing Home, Weybridge, to Pearl, wife of Robert David Plowman—a son (Piers Nicholas).

TOMBS.—On June 4, 1950, at the Stanley Nursing Home, Chester, to Doris, wife of Frank E. Tombs, L.D.S.U.Lpool, a son (Alan Frank).

WILSON.—On June 2, at the Clifton Nursing Home, to Joyce, wife of Kenneth Wilson, L.D.S. R.C.S.Eng., Wath-on-Dearne, Yorkshire, a daughter (Jeraldine)—a sister for Keith.

Marriages

COLLINS—HALE-WOODS.—On May 25, at St. Monica's, Palmers Green, David M. Collins, of Wormley, Herts, to Anne Marie Hale-Woods of Broxbourne, Herts.

DAGGER—ASKE.—On June 10, 1950, at Exeter Cathedral, Henry Dagger, B.D.S., L.D.S. R.C.S., of " Devon Villa ", Newton Abbot to Eileen Aske of Holne Chase Hotel, Ashburton, Devon.

Deaths

GUY.—On May 28, 1950, at 11 Wemyss Place, Edinburgh, William Guy, LL.D., F.R.C.S., L.R.C.P., H.D.D., F.D.S. R.C.S.Eng. and Edin., F.R.C.S.E., aged 90 years, former Dean, Edinburgh Dental Hospital and past President, British Dental Association.

JAMESON.—In May, 1950, John T. Jameson, M.D.S.Durh., F.D.S. R.C.S.Eng., of 12 Windsor Crescent, Jesmond Road, Newcastle-on-Tyne 2, aged 87. Former Dean of the Newcastle Dental Hospital and past President, British Dental Association.

Our Diary

Thursday, June 22.

Metropolitan Branch—Northern Section —Britannia Hotel, Camden Town, N.W.1, 7.45 p.m., preceded by supper, 7 p.m. "The Metropolitan Branch—Past, Present and Future," A. C. Mack.

Tuesday, June 27.

Preston, Leyland and Chorley Section.—Starkie House, Starkie Street, Preston.

Thursday, June 29.

Royal Dental Hospital Students' Society — Royal Dental Hospital, Leicester Square, London, W.C.2, 5 p.m. " Pathology and the Dental Surgeon," R. B. Lucas.

Saturday, July 1.

Public Dental Officers' Group—Yorkshire Division.—Y.M.C.A., Albion Place, Leeds 1, 3 p.m. Speaker : B. R. Townend

Monday, July 10—Friday, July 14.

British Dental Association.—Annual Meeting, University of Birmingham.

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